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the witches their scent or the means of indentifying them. The savage who refuses to allow his picture to be taken, and the felon who objects to having his 'mug' adorn the walls of Rogues's gallery, are not so far apart, if we can bring our minds to identify the devil of the former with the detective of the latter. O. T. MASON.

#### PROFESSOR NEWBERRY ON EARTHQUAKES.

PROFESSOR NEWBERRY'S paper on earthquakes is, in the words of the author, "a brief review of what is known and believed in regard to the phenomena and causes of earthquakes by those whose opinions on this subject are most worthy of confidence." After defining the word 'earthquake,' he proceeds to give a summary of the facts upon which he bases his definition, carefully elaborating and illustrating the subject from the point of view of a cooling and contracting sphere, with a relatively thin crust, and fluid or viscous interior. The latter part of the essay is treated under the headings, 'Earthquakes and volcanoes as measures of the thickness of the earth's crust,' and 'Flexibility of the earth's crust.' Finally, 'Proximate causes of earthquakes' are briefly considered, and a short bibliography is appended.

The definition, which is taken as the text, and which is really an epitome of the whole argument, is as follows: "An earthquake is a movement caused by a shrinking from the loss of heat of the heated interior of the earth, and the crushing-together and displacement of the rigid exterior as it accommodates itself to the contracting nucleus." It is then stated that the facts upon which this statement is based are so numerous and significant that the conclusion 'is not only convincing, but inevitable.' Although this broad generalization is perhaps applicable in the case of most earthquakes, and the theory as to the structure of the earth which it involves is very generally accepted by geologists, yet, in view of the fact that many eminent scientific men are not prepared to subscribe to it at all, in either case it is to be regretted that the author has not adopted the comprehensive and more non-committal definition given by Mallet, and substantially repeated as follows by Powell (in *The forum* for December): "An earthquake is the passage of waves of elastic compression in the crust of the earth." The very fact that different theories are to be found, even in the very latest utterances of eminent authorities, would seem to make it desirable to acknowledge that the subject is not one that

can be disposed of in such an *ex cathedra* statement, but rather one worthy of the most painstaking study, which, indeed, it is now receiving from the most advanced nations. The further statement that "earthquakes are neither novel nor mysterious, but are among the most common and simplest of terrestrial phenomena," is not likely to receive very wide acceptance in its entirety, and issue will certainly be taken with Professor Newberry as to there being any very great degree of unanimity in this opinion among "those whose opinions are most worthy of confidence." Similarly it must be said that far more confidence is placed by the author in the various methods of calculating the depth of origin by means of accurate observations as to time and angle of emergence than seems warranted. The problem is so complicated by the great heterogeneity of the superficial formation of the earth's crust, that the best observations we can make, give, at best, only roughly approximate results. Again, it is stated that the reported shortening of railroad-tracks in certain places near Charleston, "if verified and measured, would give a clew to the location and extent of the subterranean movements which produced the vibrations." Most authorities, however, will probably regard it, in the case of a shock disturbing so great an area, as an entirely secondary effect, along with the production of local sinks, geysers, and land-slides.

This well arranged and condensed *résumé* of the subject, from the stand-point of a geologist of Professor Newberry's reputation, cannot fail to be read with interest by the general reader as well as by the special student. The only criticism that can be made, other than favorable, seems to be that to the average reader it may leave the impression that the causes of all earthquakes, and even the nature of the earth's interior, are now so well understood as to leave very little room for difference of opinion among those best qualified to judge. EVERETT HAYDEN.

#### PHANTASMS OF THE LIVING.

THIS is a most extraordinary work, — fourteen hundred large and closely printed pages by men of the rarest intellectual qualifications, for the purpose of setting on its legs again a belief which the common consent of the 'enlightened' has long ago relegated to the rubbish-heap of old wives' tales. In any reputable department of science the qualities displayed in these volumes would be reckoned superlatively good. Untiring zeal in collecting facts, and patience in seeking to

*Earthquakes.* By Prof. J. S. NEWBERRY. New York, *The author*, 1886. 8°.

*Phantasms of the living.* By EDMUND GURNEY, FREDERIC W. H. MYERS, and FRANK PODMORE. 2 vols. London, *Trübner*, 1886. 8°.

make them accurate; learning, of the solidest sort, in discussing them; in theorizing, subtlety and originality, and, above all, fairness, for the work absolutely reeks with candor, — this combination of characters is assuredly not found in *every* bit of so-called scientific research that is published in our day.

The book hardly admits of detailed criticism, so much depends on the minutiae of the special cases reported: so I will give a broad sketch of its contents. The title, 'Phantasms of the living,' expresses a theory on which the recorded facts are strong, but of which the latter are of course independent. The 'facts' are instances of what are commonly called 'apparitions.' Collected for the Society of psychical research, their sifting and cataloguing is a laborious piece of work which has a substantive value, whatever their definitive explanation may prove to be. Very roughly speaking, there are reported in the book about seven hundred cases of sensorial phantasms which seem vaguely or closely connected with some distant contemporaneous event. The event, in about one-half of the cases, was some one's death. In addition to these cases, Mr. Gurney has collected about six hundred of hallucinations seemingly irrelevant to any actual event, and thus has certainly a wider material to work upon than any one who has yet studied the subject of phantasms. Of course, the rationalistic way of interpreting the coincidence of so large a number with a death or other event, is to call it chance. Such a large number of 'veridical' phantasms occurring by chance would, however, imply an enormous total number of miscellaneous phantasms occurring all the while in the community. Mr. Gurney finds (to take the visual cases alone) that among 5,705 persons, interrogated at random, only 23 visual hallucinations had occurred in the last twelve years. And combining by the calculus of probabilities such data as the population drawn upon for the coincidence-cases, the adult population of the country, the number of deaths in the country within twelve years, etc., he comes to the conclusion that the odds against the chance occurrence of as many first-hand and well-attested veridical visual phantasms as his collection embraces, is as a trillion of trillions of trillions to 1. Of course, the data are extremely rough; and, in particular, the census of phantasms occurring at large in the community ought to be much wider than it is. But the veridical phantasms have, furthermore, many peculiarities. They are more apt to be visual than auditory. Casual hallucinations are oftener auditory. The person appearing is almost always recognized; not so in casual hallucinations. They tend to coincide with a particular

form of outward event, viz., death. These and other features seem to make of them a natural group of phenomena.

The next best rationalistic explanation of them is that they are fictions, wilful or innocent; and that Messrs. Gurney, Myers, and Podmore are victims, partly of the tendency to hoax, but mainly of the false memories and mythopoeitic instincts of mankind. These possibilities do not escape our authors, but receive ample consideration at their hands. Nothing, in fact, is more striking than the zeal with which they cross-examine the witnesses; nothing more admirable than the labor they spend in testing the accuracy of the stories, so far as can be done by ransacking old newspapers for obituaries and the like. If a story contains a fire burning in a grate — *presto* the Greenwich records are searched to see whether the thermometer warranted a fire on that day; if it contains a medical practitioner, the medical register is consulted to make sure *he* is correct; etc. But obviously a hoax might keep all such accessories true, and a story true as to the main point might have grown false as to dates and accessories. It therefore comes back essentially to the investigator's instinct, or *nose*, as one might call it, for good and bad evidence. A born dupe will go astray, with every precaution; a born judge will keep the path, with few. *Saturday reviewers* will dispose of the work in the simplest possible way by treating the authors as born dupes. 'Scientists' who prefer offhand methods will do the same. Other readers will be baffled, many convinced. The present writer finds that some of the cases accounted strong by the authors strike him in the reading as weak, while scruples shown by them in other cases seem to him fanciful. This is the pivot of the whole matter; for I suppose the improbability of the phantasms being veridical by chance, will, if the *stories* are true, be felt by every one. Meanwhile it must be remembered, that, so far as expertness in judging of truth comes from training, no reader can possibly be as expert as the authors. The way to become expert in a matter is to get lots of experience of that particular matter. Neither a specialist in nervous diseases, nor a criminal lawyer, will be expert in dealing with these stories until he has had Messrs. Gurney's, Myers's, and Podmore's special education. Then his pathology, or his familiarity with false evidence, may also serve him in good stead. But in him, or in them, 'gumption' will, after all, be the basis of superiority. How much of it the authors have, the future alone can decide.

One argument against the value of the evidence they rely on is drawn from the history of witchcraft. Nowhere, it is said (as by Mr. Lecky in his

'Rationalism'), is better-attested evidence for facts; yet the evidence is now utterly discredited, and the facts, then apparently so plenty, occur no more. Mr. Gurney considers this objection, and comes to an extremely interesting result. After "careful search through about 260 books on the subject (including the principal ones of the sixteenth, seventeenth, and eighteenth centuries) and a large number of contemporary records of trials," he affirms that the only facts of witchcraft for which there is any good evidence whatever are those neuropathic phenomena (trance, anaesthesia, hysteria, 'suggestion,' etc.) which, so far from being now discredited, are more than ever ascertained; while the marvels like conveyance through the air, transformation into animals, etc., do not rest on a *single* first-hand statement made by a person not 'possessed' or under torture.

The authors' theory of veridical phantasms is that they are caused by thought-transference. The ghost theory and the 'astral-form' theory are criticised as unsatisfactory (ghosts of clothes, phantasms not seen by all present, etc.). Thought-transference has been once for all established as a *vera causa*. Why not assume that even the impressions announcing death were made during the last moments of the dying person's life?

Where the apparition is to several witnesses, this explanation has to be much strained; and, in spite of Messrs. Myers's and Gurney's ingenuity, I can hardly feel as if they had made out a very plausible case. But any theory helps the analysis of facts; and I do not understand that Messrs. Gurney and Myers hold their telepathic explanation to have at present much more than this provisional sort of importance.

I have given my impression of the ability of the work. My impression of its success is this: the authors have placed a matter which, previous to them, had been handled so loosely as not to compel the attention of scientific minds, in a position which makes inattention impossible. They have established a presumption, to say the least, which it will need further statistical research either to undo or to confirm. They have at the same time made further statistical research easy; for their volumes will certainly stimulate the immediate registration and publication, on a large scale, of cases of hallucinations (both veridical and casual) which but for them would have been kept private. The next twenty-five years will then probably decide the question. Either a flood of confirmatory phenomena, caught in the act, will pour in, in consequence of their work; or it will *not* pour in — and then we shall legitimately enough explain the stories here preserved as mixtures of odd coincidence with fiction. In the one case Messrs.

Gurney and Myers will have made an epoch in science, and will take rank among the immortals as the first effective prophets of a doctrine whose ineffectual prophets have been many. In the other case they will have made as great a wreck and misuse of noble faculties as the sun is often called to look down upon. The prudent bystander will be in no haste to prophesy; or, if he prophesy, he will hedge. I may be lacking in prudence; but I feel that I ought to describe the total effect left at present by the book on my mind. It is a strong suspicion that its authors will prove to be on the winning side. It will surprise me after this if neither 'telepathy' nor 'veridical hallucinations' are among the beliefs which the future tends to confirm.

WILLIAM JAMES.

#### MURRAY'S HANDBOOK OF PSYCHOLOGY.

DR. MURRAY has written an excellent elementary text-book for students of psychology. In the present state of that science, it is difficult to present its doctrines in a form suitable for didactic purposes. It is often necessary for the author to leave untouched certain important questions, the settlement of which is only possible by a controversial excursion into the department of metaphysics.

Dr. Murray's book is not a treatise on physiological psychology, although the conclusions of physiologists seem to be familiar to him. He has occupied himself chiefly with what is called 'subjective psychology,'—a field which must be traversed before one can enter upon the more positive science of the relation of psychical to nervous states. He treats of psychology and its method, gives a full and satisfactory account of sensation, analyzing the knowledge given by the various senses, and noticing the subject of general or organic sensations. This is followed by an account of association and its laws, and a short chapter on comparison. These subjects constitute what he describes as 'general psychology.'

'Special psychology' has to do with 'cognitions, feelings, and volitions,'—a threefold division, corresponding to the classical partition of 'intellect, feeling, and will.' Under the head of 'cognitions' we find an account of perceptions, generalization, reasoning, idealization, illusory cognitions, and a chapter on the general nature of knowledge, which discusses 'self-consciousness, time, space, substance, and cause' from the psychological rather than the metaphysical point of view. After an introduction treating of the nature of pleasure and pain and the expression

*A handbook of psychology.* By J. CLARK MURRAY. London, Gardner, 1885.